



US006500453B2

(12) **United States Patent**
Brey et al.(10) **Patent No.:** US 6,500,453 B2
(45) **Date of Patent:** Dec. 31, 2002(54) **POLYMERIZABLE FATTY ACIDS,
PHOSPHOLIPIDS AND POLYMERIZED
LIPOSOMES THEREFROM**(75) Inventors: **Robert N Brey**, Alpharetta, GA (US);
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Bluff, IL (US)(*) Notice: Subject to any disclaimer, the term of this
patent is extended or adjusted under 35
U.S.C. 154(b) by 0 days.(21) Appl. No.: **10/013,689**(22) Filed: **Dec. 13, 2001**(65) **Prior Publication Data**

US 2002/0041861 A1 Apr. 11, 2002

Related U.S. Application Data(62) Division of application No. 09/714,103, filed on Nov. 17,
2000, which is a continuation of application No. 09/002,145,
filed on Dec. 31, 1997, now Pat. No. 6,187,335.(51) **Int. Cl.⁷** **A61K 9/127**; C07C 69/34;
C07C 230/00(52) **U.S. Cl.** **424/450**; 560/198; 564/123;
514/557(58) **Field of Search** 424/450, 400,
424/1.21, 9,321, 9.51, 417, 94.3; 560/198;
564/123; 428/402.2; 935/54; 514/557(56) **References Cited****U.S. PATENT DOCUMENTS**

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(57) ABSTRACT

The invention relates to an oral drug delivery system which delivers biologically active substances to the mucosal tissue of the intestine utilizing novel polymerized liposomes. Novel polymerizable fatty acids having a polymerizable group, a surfactant group, and a functional group, and optionally coupled to ligands which target mucosal tissue in the intestine are disclosed. Novel negatively charged polymerizable lipids which have phosphatidyl inositol (PI), phosphatidyl glycerol (PG) or phosphatidyl serine (PS) groups on a polymerizable backbone are also described.

11 Claims, No Drawings